**MarketHub**

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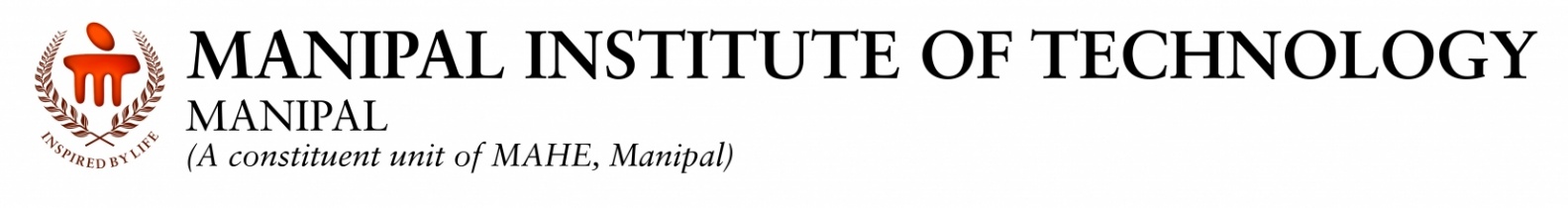
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**ABSTRACT**

**Abstract**

MarketHub is an integrated web-based platform designed to streamline wholesale business operations by providing tools for suppliers and customers to manage purchasing, transport, shipment tracking, and returns efficiently. The system leverages Python Flask for backend development and MySQL for database management. Key features include user management, product cataloging, order tracking, shipment management, discounts/offers management, returns/refunds handling, and warehouse monitoring. This report outlines the development process, technical specifications, and implementation details of MarketHub.

**ACM taxonomy**

- Software Engineering: Requirements/Specifications

- Information Systems: E-commerce Infrastructure

**SDG**

MarketHub aligns with several Sustainable Development Goals:

- Goal 8: Decent Work and Economic Growth by promoting efficient wholesale business operations.

- Goal 9: Industry, Innovation, and Infrastructure by leveraging technology for streamlined business processes.

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**Abbreviations**

- RBAC: Role-Based Access Control

- SRS: Software Requirements Specification

- ERD: Entity-Relationship Diagram

**Chapter 1 – Introduction**

**1.1 Purpose**

MarketHub is made to help wholesale businesses work more easily and efficiently. It’s a digital platform where suppliers and customers can connect and manage everything in one place. The main goal is to make everyday tasks like buying products, tracking shipments, handling returns, and managing stock faster and simpler.

MarketHub is useful for both businesses and customers. Suppliers can list their products, give discounts, and track stock levels, while customers can browse, place orders, and see where their shipments are. The platform also makes it easier to return items or ask for refunds if something goes wrong.

Another big purpose of MarketHub is to save time and reduce mistakes by automating tasks that would normally be done by hand. It’s designed to be easy to use, so people with different roles like warehouse managers, delivery staff, or business owners can quickly find what they need and get their work done. MarketHub also helps businesses make better decisions by showing useful data, like which products are selling the most or where delays are happening.

Overall, MarketHub helps businesses grow by improving how they serve their customers and manage their daily operations.

**1.2 Scope**

MarketHub includes several key modules:

- User Management: Registration, login, and role-based access control.

- Product Management: Viewing, categorizing, and reviewing products.

- Order Management: Order placement, tracking, and order history.

- Shipment Management: Transport assignment, status tracking, delivery estimation.

- Discounts and Offers: Managing discounts and offers for products.

- Returns and Refunds: Handling product returns and refunds, as well as complaint resolution.

- Warehouse Management: Stock monitoring and restock alerts.

**1.3 Intended Audience**

This document is intended for:

- Developers: For the technical implementation of the system.

- Testers: These are used to understand the functionalities and performance requirements.

- Stakeholders: To review the system's functionality, scope, and features.

**Chapter 2 – Background**

In today’s world, many wholesale businesses use online platforms to manage their work. However, a lot of these platforms are not well-connected or complete. This means that suppliers and customers often face problems while trying to place orders, track shipments, or manage returns. For example, a customer might not know when their order will arrive, or a supplier might lose track of which products have been shipped and which haven’t. These small problems can add up and create delays, confusion, and unhappy customers.

One of the main issues with existing systems is that they only focus on certain parts of the business, instead of bringing everything together. Many platforms are designed for retail businesses where people buy single items for personal use. These platforms usually don’t work well for wholesale businesses that deal with larger orders, bulk shipments, and more complex processes.

This is where **MarketHub** comes in. It was created to fix these common problems. MarketHub connects all parts of a wholesale business—from suppliers to customers—and helps them work together smoothly. It combines different tools like order placement, product management, shipment tracking, warehouse control, returns handling, and customer communication into one single platform. This makes it easier for everyone involved to stay informed and get their work done quickly and correctly.

By using MarketHub, businesses don’t have to switch between different apps or websites. Everything they need is in one place. This saves time, reduces mistakes, and makes customers happier. It also helps businesses grow by making their operations more organized and efficient.

In short, MarketHub was made to improve the way wholesale businesses work by solving problems that other platforms don’t fully handle. It gives both suppliers and customers a better, faster, and more reliable way to do business.

**Chapter 3 – Objective / Problem Statement**

**3.1 Problem Statement**

Many wholesale businesses today face several problems in how they run their daily activities. One big issue is that order management is often slow and confusing. Sometimes, it takes a long time to process orders, and customers are left waiting without knowing what’s going on. Another problem is the lack of real-time tracking. Once a shipment is on its way, both customers and suppliers don’t always get clear updates about where it is or when it will arrive. This can lead to delays, missed deliveries, and unhappy customers.

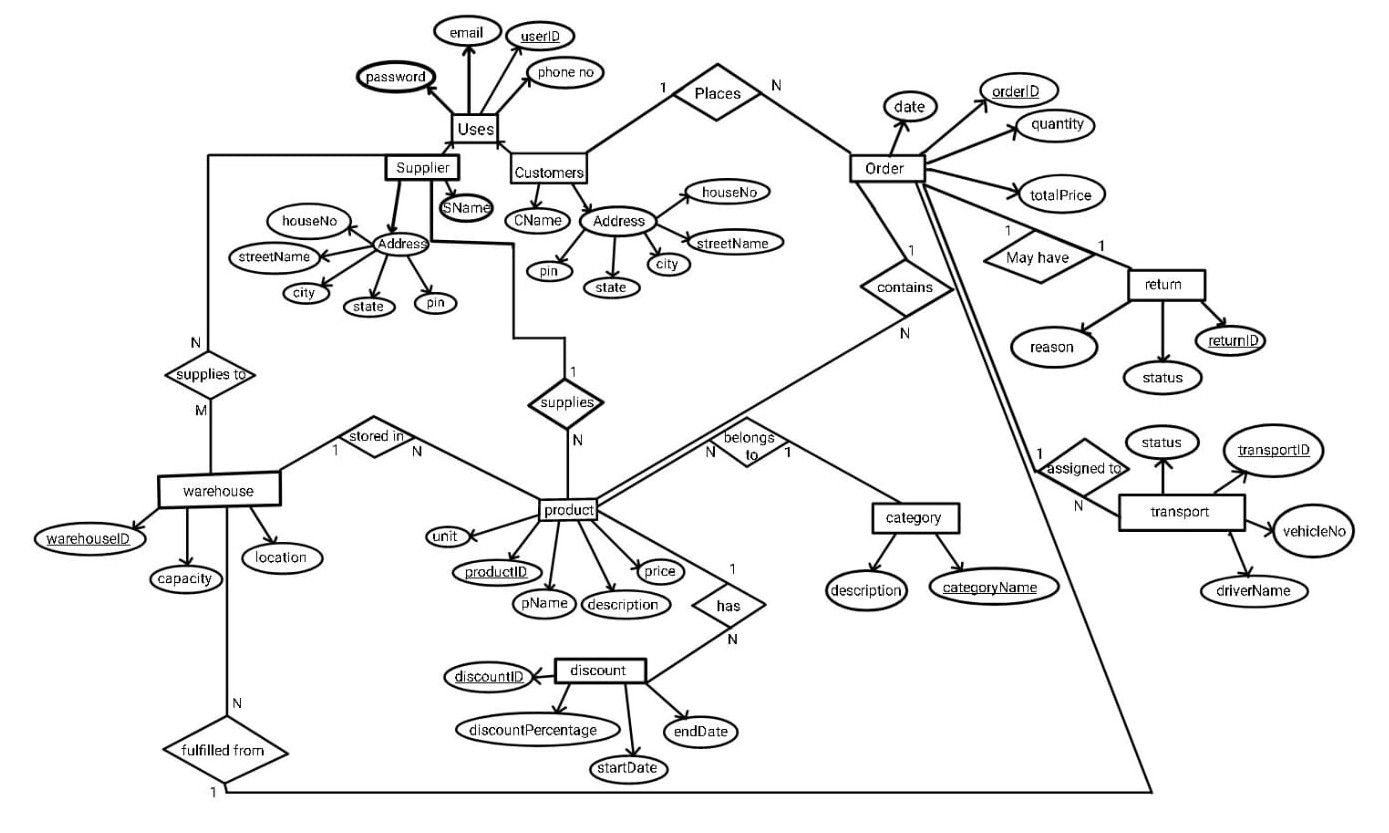
On top of that, the process of returning products or handling complaints is often complicated and frustrating. Customers may have trouble requesting returns or refunds, and suppliers may find it hard to manage those requests properly. These problems cause stress for both sides and can hurt a business’s reputation.

All of these issues, slow order handling, poor shipment tracking, and hard-to-manage returns—make the whole system less efficient. They also increase costs for the business, since more time and effort are needed to fix these problems. In the end, customers may become unhappy and look for better service elsewhere.

**3.2 Objectives**

* Streamline Operations: Combine all wholesale business activities, like orders, shipments, and returns into one easy-to-use platform.
* Enhance User Experience: Provide real-time tracking and notifications to keep users updated at every step.
* Improve Efficiency: Save time and reduce errors by automating tasks and improving communication between suppliers and customers.

**Chapter 4 – Data Design**

* 1.  **ER Design**

**4.1.1 Entities**

* + - 1. The User entity represents individuals registered in the system. It acts as the base entity for generalized roles such as Supplier and Customer. Each user has a unique identifier (userID) and authentication attributes like password.
      2. Supplier: The Supplier entity inherits attributes from User and stores additional details specific to suppliers, such as their name (sName), contact information, and address.
      3. Customer: Like Supplier, the Customer entity inherits attributes from User and includes customer-specific details such as their name (cName), contact information, and address.
      4. Product: The Product entity represents items available for purchase. Each product is uniquely identified by productID, and it has attributes such as pName, description, price, and unit.
      5. Category: The Category entity groups products under specific classifications (categoryName), with a description to provide additional context.
      6. Order: The Order entity represents purchase orders placed by customers. It includes attributes such as orderID, date, quantity, and totalPrice.
      7. Return: The Return entity represents instances where customers return products. It includes attributes such as returnID, reason, status, and the associated orderID.
      8. Transport: The Transport entity tracks delivery logistics, including vehicles and drivers assigned to orders. Attributes such as transportID, vehicleNo, driverName, and status ensure detailed shipment tracking.
      9. Warehouse: The Warehouse entity represents locations where products are stored. Attributes such as warehouseID, location, and capacity define the storage facilities.
      10. Discount: The Discount entity represents promotional offers on products. Attributes such as discountID, discountPercentage, startDate, and endDate link discounts to specific products.
  1. **Reduction**
     1. **Mapping entities to relations**

Each entity is converted into a relation with attributes and primary keys.

|  |  |  |
| --- | --- | --- |
| Entity | Attributes | Primary Key |
| User | userID, password | userID |
| Supplier | email, phoneNo, address(houseNo, streetName, city, state, pin), sName | Foreign key userID from User |
| Customer | email, phoneNo, address(houseNo, streetName, city, state, pin), cName | Foreign key userID from User |
| Product | productID, pName, description, price, unit | productID |
| Category | categoryName, description | categoryName |
| Order | orderID, date, quantity, totalPrice | orderID |
| Return | returnID, reason, status | returnID |
| Transport | transportID, vehicleNo, driverName, status | transportID |
| Warehouse | warehouseID, location, capacity | warehouseID |
| Discount | discountID, discountPercentage, startDate, endDate | discountID |

* + 1. **Handling generalization**

The ‘user’ entity is generalized into ‘supplier’ and ‘customer’.

Supplier and customer inherit userID from user.

|  |  |  |
| --- | --- | --- |
| Entity | Attributes | Primary Key |
| User | userID, password | userID |
| Supplier | email, phoneNo, address(houseNo, streetName, city, state, pin), sName, userID | Foreign key userID from User |
| Customer | email, phoneNo, address(houseNo, streetName, city, state, pin), cName, userID | Foreign key userID from User |

* + 1. **Converting relationships**

The following relationships are present in the ER diagram,

|  |  |  |
| --- | --- | --- |
| Relationship | Type | Implementation |
| Customer-order | One to many | Customer places order |
| Order-product | Many to many | Order contains product |
| Order-return | One to one | Order may have return |
| Order-transport | One to many | Order assigned to transport |
| Product-category | Many to one | Product belongs to category |
| Supplier-product | One to many | Supplier supplies product |
| Product-discount | One to many | Product has discount |
| Supplier-warehouse | Many to many | Supplier supplies to warehouse |
| Warehouse-product | One to many | Product stored in warehouse |
| Warehouse-order | Many to one | Order fulfilled from warehouse |

One to many: foreign keys are used to maintain references

Many to many: join tables are created

Updated list of tables,

|  |  |  |
| --- | --- | --- |
| Entity | Attributes | Primary Key |
| User | userID, password | userID |
| Supplier | email, phoneNo, address(houseNo, streetName, city, state, pin), sName, userID(references user) | Foreign key userID from User |
| Customer | email, phoneNo, address(houseNo, streetName, city, state, pin), cName, userID(references user) | Foreign key userID from User |
| Product | productID, pName, description, price, unit, categoryName(references category), userID(references supplier), warehouseID(references warehouse), orderID(references order) | productID |
| Category | categoryName, description | categoryName |
| Order | orderID, date, quantity, totalPrice, userID(references customer) | orderID |
| Return | returnID, reason, status, orderID(references order) | returnID |
| Transport | transportID, vehicleNo, driverName, status, orderID(references order) | transportID |
| Warehouse | warehouseID, location, capacity, orderID(references order) | warehouseID |
| Discount | discountID, discountPercentage, startDate, endDate, productID(references product) | discountID |
| Supplies | userID(references supplier), warehouseID(references warehouse) | userID, warehouseID |

* + 1. **Handling Composite and Multivalued Attributes**

Address is a composite attribute.

The address attribute was decomposed into atomic fields (houseNo, city, etc.) to enable location-based analytics and comply with 1NF.

|  |  |  |
| --- | --- | --- |
| Entity | Attributes | Primary Key |
| User | userID, password | userID |
| Supplier | userID, sName, email, phoneNo | userID |
| Customer | userID, cName, email, phoneNo | userID |
| Address | userID, houseNo, streetName, city, state, pin | UserID |

* 1. **Normalization**
     1. **First Normal Form (1NF)**

Ensure atomic values (no multivalued attributes or repeating groups).

If warehouseID and orderID are stored in the product table (according to reduction rules) it will need to unnecessary repeating of details. A similar problem occurs with orderID being stored in the warehouse table to avoid it, the following changes can be made:

|  |  |  |
| --- | --- | --- |
| Entity | Attributes | Primary Key |
| Product | productID, pName, description, price, unit, categoryName(references category), userID(references supplier) | productID |
| Order | orderID, date, quantity, totalPrice, userID(references customer) | orderID |
| Warehouse | warehouseID, location, capacity | warehouseID |
| Contains | orderID(references order), productID(references product), productQuantity | orderID, productID |
| Storage | warehouseID(references warehouse), productID(references product), productQuantity | warehouseID, productID |
| Fulfil | warehouseID(references warehouse), orderID(references order), productID(references contains) | warehouseID, orderID, productID |

* + 1. **Second Normal Form (2NF)**

Remove partial dependencies. Partial dependencies were eliminated by ensuring all non-key attributes depend entirely on primary keys.

* + 1. **Third Normal Form (3NF)**

Remove transitive dependencies. Transitive dependencies were eliminated by ensuring all non-key attributes depend entirely on primary keys.

* 1. **Relational Schema**

These are the final relations,

**User table**

|  |  |  |
| --- | --- | --- |
| Attribute | Data type | Constraints |
| UserID | VARCHAR (10) | Primary key |
| Password | VARCHAR (20) | NOT NULL |

**Supplier table**

|  |  |  |
| --- | --- | --- |
| Attribute | Data type | Constraints |
| UserID | VARCHAR (10) | Primary key, Foreign key references **User** |
| sName | VARCHAR(20) | NOT NULL |
| Email | VARCHAR(50) | NOT NULL |
| Password | VARCHAR (20) | NOT NULL |
| PhoneNo | INT | NOT NULL |

**Customer table**

|  |  |  |
| --- | --- | --- |
| Attribute | Data type | Constraints |
| UserID | VARCHAR (10) | Primary key, Foreign key references **User** |
| cName | VARCHAR(20) | NOT NULL |
| Email | VARCHAR(50) | NOT NULL |
| Password | VARCHAR (20) | NOT NULL |
| PhoneNo | INT | NOT NULL |

**Address table**

|  |  |  |
| --- | --- | --- |
| Attribute | Data type | Constraints |
| UserID | VARCHAR (10) | Primary key, Foreign key references **User** |
| houseNo | VARCHAR (10) | NOT NULL |
| streetName | VARCHAR (50) | NOT NULL |
| City | VARCHAR (50) | NOT NULL |
| State | VARCHAR (50) | NOT NULL |
| PIN | INT | NOT NULL |

**Product table**

|  |  |  |
| --- | --- | --- |
| Attribute | Data type | Constraints |
| productID | VARCHAR (10) | Primary key |
| pName | VARCHAR(50) | NOT NULL |
| Description | VARCHAR (100) | NOT NULL |
| Price | INT | NOT NULL |
| Unit | VARCHAR(10) | NOT NULL |
| categoryName | VARCHAR (50) | Foreign key references **category** |
| userID | VARCHAR (10) | Foreign key references **Supplier** |

**Order table**

|  |  |  |
| --- | --- | --- |
| Attribute | Data type | Constraints |
| orderID | VARCHAR (10) | Primary key |
| Date | DATE | NOT NULL |
| Quantity | INT | NOT NULL |
| totalPrice | INT | NOT NULL |
| userID | INT | Foreign key references **customer** |

**Warehouse table**

|  |  |  |
| --- | --- | --- |
| Attribute | Data type | Constraints |
| warehouseID | VARCHAR (10) | Primary key |
| Location | VARCHAR(50) | NOT NULL |
| Capacity | INT | NOT NULL |

**Category table**

|  |  |  |
| --- | --- | --- |
| Attribute | Data type | Constraints |
| categoryName | VARCHAR (30) | Primary key |
| Description | VARCHAR(50) | NOT NULL |

**Return table**

|  |  |  |
| --- | --- | --- |
| Attribute | Data type | Constraints |
| returnID | VARCHAR (10) | Primary key |
| Reason | VARCHAR (100) | NOT NULL |
| Status | VARCHAR (10) | NOT NULL |
| orderID | VARCHAR (10) | Foreign key references **order** |

**Transport table**

|  |  |  |
| --- | --- | --- |
| Attribute | Data type | Constraints |
| transportID | VARCHAR (10) | Primary key |
| vehicleNo | VARCHAR(10) | NOT NULL |
| driverName | VARCHAR (20) | NOT NULL |
| Status | VARCHAR (10) | NOT NULL |

**Shipment table**

|  |  |  |
| --- | --- | --- |
| Attribute | Data type | Constraints |
| transportID | VARCHAR (10) | Primary key |
| orderID | VARCHAR(10) | Primary key |

**Discount table**

|  |  |  |
| --- | --- | --- |
| Attribute | Data type | Constraints |
| discountID | VARCHAR (10) | Primary key |
| discountPercentage | INT | NOT NULL |
| startDate | DATE | NOT NULL |
| endDate | DATE | NOT NULL |
| productID | VARCHAR (10) | Foreign key references **product** |

**Supplies table**

|  |  |  |
| --- | --- | --- |
| Attribute | Data type | Constraints |
| userID | VARCHAR (10) | Primary key |
| warehouseID | VARCHAR (10) | Primary key |

**Contains table**

|  |  |  |
| --- | --- | --- |
| Attribute | Data type | Constraints |
| orderID | VARCHAR (10) | Primary key |
| productID | VARCHAR (10) | Primary key |
| Quantity | INT | NOT NULL |

**Storage table**

|  |  |  |
| --- | --- | --- |
| Attribute | Data type | Constraints |
| warehouseID | VARCHAR (10) | Primary key |
| productID | VARCHAR (10) | Primary key |
| productQuantity | INT | NOT NULL |

**Fulfill table**

|  |  |  |
| --- | --- | --- |
| Attribute | Data type | Constraints |
| orderID | VARCHAR (10) | Primary key |
| productID | VARCHAR (10) | Primary key |
| warehouseID | VARCHAR (10) | Primary key |

**Chapter 5 – Methodology**

**Implementation details with block diagram to explain the project in detail**

**5.1 Implementation Details**

MarketHub uses:

- Frontend: HTML, CSS, JavaScript for a responsive user interface.

- Backend: Python Flask for efficient server-side logic.

- Database: MySQL for storing and querying business data.

**5.2 System Architecture**

Figure 2: System Architecture Block Diagram

The system architecture includes:

- User Interaction: Customers and suppliers interact with the front end.

- Backend Processing: Python Flask handles requests and updates the database.

- Database Communication: MySQL stores and retrieves data.

**Chapter 6 – Results**

After creating and testing MarketHub, the platform successfully helped solve many of the problems faced by wholesale businesses. Users found it much easier to manage their orders, track shipments, and handle returns all in one place.

Suppliers were able to update stock levels, offer discounts, and process orders faster. Customers enjoyed getting real-time updates about their shipments and could easily contact support or request returns when needed.

By bringing everything into one system, MarketHub saved time, reduced mistakes, and improved communication. Overall, businesses were able to work more efficiently, and customer satisfaction increased.

**Chapter 7 – Conclusion and Future Work**

MarketHub was created to solve common problems in wholesale businesses, like slow order management, poor shipment tracking, and difficult return processes. Bringing all important features into one platform, it made daily operations easier and faster for both suppliers and customers.

The system helped save time, reduced errors and made communication smoother. Customers were more satisfied because they could track their orders and get help quickly. Suppliers could manage their work better and focus on growing their business.

In conclusion, MarketHub proves that with the right tools, wholesale businesses can work more efficiently, keep customers happy, and achieve better results.

**7.2 Future Work**

Proposed enhancements include:

- Payment Gateway Integration: Integrate payment processors like Razorpay or Stripe.

- Advanced Analytics: Implement analytics for supplier and customer trends.

- Customer Support Mechanism: Develop a chatbot-based support system.

**Chapter 8 – References**

**In IEEE format**

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